Royal Australian Air Force (RAAF) Base Richmond

PFAS ONGOING MONITORING PLAN

Australian Government
Defence

PFAS INVESTIGATION AND MANAGEMENT PROGRAM

SERVICE
COURAGE
RESPECT
INTEGRITY
EXCELLENCE

Royal Australian Air Force (RAAF) Base Richmond

PFAS ONGOING MONITORING PLAN

April 2025

ACKNOWLEDGEMENT OF COUNTRY

Defence acknowledges the Traditional Custodians of Country throughout Australia. Defence recognises their continuing connection to traditional lands and waters and would like to pay respect to their Elders both past and present. Defence would also like to pay respect to the Aboriginal and Torres Strait Islander peoples who have contributed to the defence of Australia in times of peace and war.

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GLOSSARY

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure, as amended 2013
Base	RAAF Base Richmond
BoM	Bureau of Meteorology
CSM	Conceptual Site Model
DO	Dissolved Oxygen
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority (or relevant state/territory jurisdiction)
ERA	Ecological Risk Assessment
HHRA	Human Health Risk Assessment
LOR	Limit of Reporting
Management Area	The geographical area subject to Defence risk management actions. May include private or Defence owned detached properties beyond the boundaries of the base.
µg/L	Micrograms per litre
NATA	National Association of Testing Authorities
Off-site	Off-base (or other Defence property)
OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
On-site	On-base (or other Defence property)
PFAS	Per- and polyfluoroalkyl Substances
PFAS NEMP	PFAS National Environmental Management Plan
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PMAP	PFAS Management Area Plan
QA	Quality Assurance
QC	Quality Control
RAP	Remediation Action Plan
Risk management actions	Remediation and management actions to address potential risks to receptors from PFAS contamination

SAQP	Sampling, Analysis and Quality Plan
SFARP	So Far as Reasonably Practicable
Source	A source can be primary or secondary. Primary sources are generally areas where AFFF was used or stored. Secondary sources may be an accumulation of contamination in the environment, such as in soil, sediments, or surface water bodies.
SWL	Standing Water Level
TDS	Total Dissolved Solids

1 INTRODUCTION

1.1 Background

In August 2019 Defence prepared a PFAS Management Area Plan (PMAP) for managing risks to human health and the environment from per- and poly-fluoroalkyl substances (PFAS) contamination associated with the Royal Australian Air Force (RAAF) Base Richmond (the Base) and surrounding areas. The PMAP is currently being updated (as of October 2024) to reflect the status of PFAS contamination and risk management actions at the Base.

An important requirement of the PMAP is to undertake ongoing monitoring of PFAS in the environment and to assess for changes in risks to human and ecological receptors from PFAS originating from the base.

Concurrently the Ongoing Monitoring Plan (OMP) requirements have been reviewed and a revised OMP (this document) has been prepared. This OMP replaces the August 2019 OMP.

1.2 Purpose

The OMP sets out requirements for collection of adequate data to identify and evaluate:

- spatial, and temporal variability of PFAS in the environment
- changes to sources, transport pathways and/or receptors, described as a conceptual site model (CSM) for the base
- whether risks to human and ecological receptors require review
- the influence that risk management activities at the base, as outlined in the August 2019 PMAP have had on PFAS in the environment, and
- whether the identified changes trigger an action and/or review.

The data collected may be used to inform where new risk management actions may be required, or to support a determination that remediation has been completed so far as reasonably practicable.

1.3 Supporting information

In developing the OMP, reference has been made to the PFAS National Environmental Management Plan (PFAS NEMP), the National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM) and Defence estate, environmental and PFAS-specific strategies and guidance, and other information as provided in the References section of this document.

1.4 Constraints and assumptions

This OMP has been prepared based on information available at the time of writing and relies on the findings of the Detailed Site Investigation (DSI), risk assessments, mass flux assessments, remediation activities, ongoing monitoring program data, and management of risks documented in the 2019 PMAP. Defence recognises that there may still be gaps in information, and if required these will be progressively addressed while impacted sites are being managed.

This document has been developed based on the following assumptions:

- The state of knowledge including PFAS sources, PFAS nature and extent, and conceptual site model (CSM) presented within the PMAP (Defence, 2019a) DSI (AECOM Australia Pty Ltd [AECOM], 2018a), HHRA (AECOM, 2018c) and ERA (AECOM, 2018c).
- The monitoring locations were based on the data collected to date and may be further refined as proposed management and/or remediation actions are implemented.
- Current standards and government issued guidelines, advisories and policies may change and trigger a review of the OMP.
- Access to off-site private properties designated as sampling locations will be granted, where required. Noting, access to off-site private properties has not been granted in some key locations e.g. Bakers Lagoon.

2 SITE SETTING

2.1 Base description

The Base is an active RAAF Base located on Dight St, Richmond, NSW, approximately 50 km north west of the Sydney central business district (CBD) and comprising approximately 414 hectares as shown in Figure 1, Appendix B. The Base is in the Hawkesbury City Council Local Government Area (LGA) and zoned 'SP1: 'Aerodrome/Defence Services' under the Hawkesbury Local Environmental Plan, 2012.

The Base comprises 'landside' and 'airside' areas:

- Landside areas are partially covered by hardstand and pavement consisting of concrete, asphalt roadways, and low-rise buildings for facilities and accommodation.
- Airside areas consist of the main runway, taxiways, aprons and grass covered airfield.

The Base was established as the first Air Force Base in NSW in 1925. As part of typical air base activities aqueous foam forming film (AFFF) was used at the site for firefighting activities and emergency response between approximately 1976 and 2004 (AECOM, 2018a). The primary AFFF formulation used at the site was 3M Lightwater™, which contained PFAS substances, with Perfluorooctane Sulfonate (PFOS) and Perfluorohexane Sulfonate (PFHxS) the main fluorosurfactants.

2.2 Site and management area setting

As defined in the 2019 PMAP the Management Area comprises three distinct areas as detailed in Table 1 and shown in Figure 1 in Appendix B. The term 'the site' used in this OMP refers to the On-Site Management Area.

Table 1. Management Area Description

Management Area	Description
On-Site Management Area	Defence owned land, including: • The active RAAF Base, landside and airside areas. • The sewage treatment plant (STP) and trade waste plant (TWP) located north of the Base. • Rickabys Drop Zone, which is Defence owned land located east of the Base and Percival Street.
Bakers Lagoon Management Area	Includes Bakers Lagoon and associated agricultural drains and creeks which flow from the Base towards Bakers Lagoon (north of the On-Site Management Area).
Off-Site Management Area	Includes private properties to the north, west and east of the Base. Land use within the Off-Site Management Area comprises residential, rural residential, light industrial and public recreation.

Land Uses

The current land uses in the Management Area are:

- Rural landscape – A mix of rural residential and some agricultural properties. These areas are likely to remain in the immediate future with no other key developments planned in the area.
- Special activities – aerodrome / defence.
- Environmental conservation (Bakers Lagoon).

The land use in the Management Area is not anticipated to substantially change in the next 5 years.

Surrounding land uses include:

- rural landscape (plant agriculture [turf farming], cattle farming and market gardens) primarily to the north;
- residential (suburbs of Richmond and Windsor) to the east and west;
- recreation (public parks, private golf courses and race tracks) to the south, east and west;
- commercial and general industrial to the east and west;
- environmental conservation, Pughs Lagoon to the west and wetlands associated with Rickabys Creek to the south east; and
- special activities (educational facilities) to the west, north and south.

Environmental Summary

A summary of the environmental setting of the Management Area is provided below:

- Average minimum temperatures around 3.8°C in July and maximum average temperatures of around 30.4°C in January (Bureau of Meteorology [BoM] Station 067105 [BoM, 2025]).
- Mean annual rainfall is 761 mm. Highest monthly rainfall generally occurs between January and March (averaging >80 mm per month), with the lowest rainfall in July to August (averaging <35 mm per month) (BoM Station 067105).
- Characterised by a series of wide, flat alluvial terraces associated with the Hawkesbury River. Most of the Base lies on an elevated terrace of unconsolidated solids of the Clarendon Formation and ranges from 18 to 22 metres Australian Height Datum (m AHD). To the north and east of the Base, a drop to the Hawkesbury River flood plain occurs, associated with the Lowland Formation. This lower flood plain terrace lies at approximately 6-12 m AHD and includes the STP, Rickabys Drop Zone, and the surface drainage system related to Rickabys and Cooley Creeks.
- There are no natural watercourses or natural water bodies on-site; however, several formed surface water drainage networks, constructed wetland systems and settlement ponds are present. Surface water from the site discharges to rural drains to the north and Rickabys Creek to the east (refer to Figure 2, Appendix B, for off-site discharge points).
- The nearest natural watercourses are Rickabys Creek and its unnamed network of rural drain tributaries adjacent to the north and east site boundary. Cooley Creek, Bakers Lagoon, and the Hawkesbury River are approximately 1 km to the north of the site (refer to Figure 2).
- Regional aquifers identified include fractured rock aquifers associated with the Wianamatta Group and Hawkesbury Sandstone, and younger tertiary unconsolidated aquifers, including the Clarendon Formation Aquifer (CFA) (groundwater elevation of 4.0 –7.5 m AHD) and Lowlands Formation Aquifer (LFA) (groundwater elevation of 4.3 – 6 m AHD).
- Groundwater flow direction is inferred to be generally north, north west and north east towards the Hawkesbury River.

3 EXTENT OF PFAS CONTAMINATION

This section describes the PFAS CSM, including PFAS sources, how PFAS moves in the environment (transport pathways), and the potential human and ecological receptors that may be exposed to PFAS.

3.1 Source areas

The PMAP (Defence, 2019b) identified the following locations as PFAS source areas which have been grouped based on their location and proximity on-site:

- Group 1 Source Area: Former Fire Training Ground (FFTG), Airfield Foam Cannon Testing Area (AFTCA) (CSR_NSW_000705) and historical aircraft incident sites (CSR_NSW_001133).
- Group 2 Source Area: STP (CSR_NSW_000939).
- Group 3 Source Area: Hangar 54 (CSR_NSW_000766), Fire Station Building 291 (CSR_NSW_000728).
- Group 4 Source Area: Fuel Farm 2 (CSR_NSW_000945), Tanker Parking Area (Former Fuel Farm 1)/ area used by fitters (CSR_NSW_000942), and fire vehicle former parking/maintenance area (CSR_NSW_001132).

The Source Areas are presented in Figure 3, Appendix B. The firefighting foam test facility (FTF) has also been shown on Figure 3, although not currently an identified Source Area in the PMAP, it is an area of interest that is being evaluated as a potential PFAS source area.

3.2 Transport pathways

PFAS can be transported from a source to human or environmental receptors via “transport” or “migration” pathways, such as surface water, groundwater and stormwater. The transport pathways identified at and surrounding the RAAF Base Richmond, as defined in the DSI for the site (AECOM, 2018a) are summarised below:

- Sorption of PFAS to soil in source areas i.e. where AFFF was historically used (on-site only).
- Stormwater runoff containing PFAS flowing into drains or swales and subsequent off-site migration via stormwater drainage network. PFAS impacted water ultimately discharging to the Hawkesbury River via Rickabys Creek or Cooley Creek.
- Sorption of PFAS to soils and sediment in drainage lines from stormwater/surface water flow and areas adjacent if inundated with floodwater from overflowing drains/creeks.
- Infiltration of PFAS impacted surface water (drains, water bodies, or STP effluent ponds) under ‘losing’ conditions, i.e. when surface water elevations are higher than groundwater levels.
- Leaching of PFAS from soil or sediments to shallow groundwater.
- Vertical and lateral migration of PFAS impacted groundwater under influence of groundwater flow and PFAS dispersion.
- Wind dispersion of PFAS impacted soil or dust if disturbed by excavation or construction.

The primary pathway for PFAS mass discharge off-site is via surface water, this was presented in the DSI (AECOM, 2018a) CSM and supported by the PFAS mass flux study (AECOM, 2021) findings.

3.3 Distribution of PFAS

PFAS have migrated away from source areas on the base via the surface water and groundwater pathways described above. In doing so they have spread throughout (and have been used to define) the Management Area. The nature and extent of PFAS within the Management Area, based on the DSI report (AECOM, 2018a), is summarised below.

Groundwater Impacts

The DSI (AECOM, 2018a) identified overlapping PFAS groundwater plumes associated with identified on-site source areas, with PFAS concentrations decreasing with distance from the Base. Available PFAS data indicate the combined PFAS plume is approximately 2 km long and 5 km wide (across the axis of migration), with most groundwater impacts limited to within the site boundary (refer to Figure 4, Appendix B). The inferred groundwater plume from the DSI (AECOM, 2018a) has been adjusted in previous Ongoing Monitoring Reports (OMRs), including a minor extension to the low-level concentration plume to the south and north, and the inclusion of a higher concentration plume near the FTF. Figure 4, Appendix B, shows PFOS + PFHxS concentrations in groundwater from the most recent monitoring event, May 2024.

Surface Water Impacts

The major on-site drainage systems and locations where surface water discharges from the site (to Rickabys Creek and its tributaries), sampled during the DSI (AECOM, 2018a), were found to contain PFAS. Ultimately, surface water discharges from the site to drainage networks and creeks, which flow towards the Hawkesbury River (refer to Figure 2, Appendix B). PFAS have been detected in the Hawkesbury River, including upstream of the site at North Richmond. PFAS have continued to be detected in on-site and off-site surface water in ongoing monitoring rounds since the DSI.

Surface water discharges from four key locations, as shown on Figure 2, Appendix B:

- Runoff from the north west (Catchments D, E and F) of the site, which discharges off-site into tributaries of Rickabys Creek on the Richmond Lowlands, via location SW002.
- Runoff from the north (Catchment G) of the site, which discharges off-site into a tributary of Rickabys Creek, via location SW014.
- Runoff from south and east of the site (Catchments A, B and C), which discharges off-site into Rickabys Creek via location SW009.
- Treated effluent from the on-site STP which discharges off-site to Bakers Lagoon.

The primary pathway for PFAS mass discharge off-site is via surface water. The PFAS mass flux study (AECOM, 2021) estimated that surface water accounted for 97% of site wide discharge of PFOS + PFHxS, opposed to groundwater, which was estimated to account for 3%.

The PFAS mass flux study (AECOM, 2021) found that the majority of surface water discharge is via locations SW002 and SW009. SW002 and SW009 and associated catchments are similar contributors to PFAS flux from the site under base flow conditions, but SW002 is estimated to contribute a greater amount of PFAS off-site during rainfall events (AECOM, 2021).

It is likely that flooding events will disperse PFAS from drainage lines and source areas to surface soils and potentially to shallow groundwater when infiltration occurs.

Soil Impacts

PFAS were detected in on-site and off-site soils. Elevated PFAS concentrations on-site were associated with source areas and drainage lines. Off-Site Management Area soil samples with PFAS detections were typically between the surface and 0.5 metres depth. PFAS in shallow soil may be a result of contaminated surface water used for irrigation (AECOM, 2018a).

3.4 Receptors and risks

3.4.1 Human receptors

The following receptors were identified in either the DSI (AECOM, 2018a) or HHRA (AECOM, 2018b):

On-Site Receptors

- On-site personnel who work at the Base.
- Residents who live on the Base (including adults, children and infants).
- On-site intrusive maintenance workers (e.g. involving excavation of soil) who may conduct infrequent maintenance works on underground services or non-intrusive maintenance activities (i.e. personnel who maintain the gardens and grassed areas at the site).

Off-Site Receptors

- Recreational users of publicly accessible surface waters.
- Residents within the Off-Site Management Area (including adults, children and infants).
- Commercial workers undertaking intensive plant agriculture (turf farming), market gardens and orchards.
- Council or other maintenance workers clearing/working in drains or creeks, conducting general maintenance, or intrusive works for service pit maintenance.
- Human consumers of aquatic biota (seafood) and other food (home-grown vegetables, red meat, or eggs from poultry) exposed to PFAS impacted media (including soil, sediment and water) who live within the Off-Site Management Area.
- Livestock watered from private bores and surface water bodies.
- More than 140 licence holders located between Windsor and Richmond who may extract surface water from the Hawkesbury River.

3.4.2 Ecological receptors

The following potential receptors were identified in the ERA (AECOM, 2018c):

- Terrestrial organisms in direct contact with or ingesting PFAS contaminated soil or water.
- Aquatic organisms in direct contact with PFAS contaminated surface water.
- Terrestrial and aquatic organisms that consume plants, invertebrates and/or fish from the Management Areas.

3.4.3 Elevated risks

The HHRA (AECOM, 2018c) and ERA (AECOM, 2018b) identified potentially elevated risks associated with the following pathways from the CSM:

- Ingestion of large amounts of eggs from home grown backyard poultry in the Management Area.
- Ingestion of large amounts of home-grown red meat from sheep or cattle that have consumed water containing detectable PFAS or grazed in areas irrigated or flooded with water containing detectable PFAS.

- High order predators consuming biota on-site.

The HHRA (AECOM, 2018b) noted that a small number of people who live in the Management Area and who eat a large proportion of their diet sourced from fish caught from local waterways, home-grown eggs from backyard poultry, and home-grown red meat should reduce their intake of these foods to minimise future PFAS exposure.

It is understood that groundwater is not currently used as a potable supply in the Management Area. The HHRA (AECOM, 2018c) concluded that the concentrations of PFAS measured in off-site wells suggest consumption of groundwater should not be carried out in the Management Area.

The identification of potentially elevated risks does not necessarily indicate adverse effects, but instead that management of risks and/or further investigation/assessment may be warranted.

4 ONGOING MONITORING PLAN

This section sets out the data quality objectives (DQOs), monitoring scope and assessment requirements. Changes made to the 2019 OMP are summarised in the following sections, and supporting rationale is provided in Appendix D.

4.1 Sampling, Analysis and Quality Plan

A Sampling, Analysis and Quality Plan (SAQP) will be developed prior to the implementation of the OMP. The SAQP will provide information on data quality assurance procedures and measures including data quality indicators (DQI), sampling methodologies and analytical methods. The SAQP will be updated as required.

4.2 Data Quality Objectives

The DQO process is a planning approach used to define the type, quantity and quality of data that is needed to inform decisions relating to the environmental condition of a site. The seven-step DQO process:

- clarifies the study objective
- defines the most appropriate collection of data as relevant to the study objective
- determines the conditions from which to collect data, and
- specifies tolerable limits on decision errors, which will be used as the basis for establishing the quantity and quality of data, needed to support the decision.

The DQOs for monitoring are presented in Table 2. They have been prepared in line with the DQO process outlined in the ASC NEPM (Schedule B2).

Table 2. Data Quality Objectives

Process	Description
Step 1: State the problem	Environmental investigations undertaken at the site have identified PFAS in soil, sediment, surface water and groundwater primarily resulting from the historical use of AFFF for fire protection purposes. The DSI (AECOM, 2018a) confirmed that the identified PFAS impacts in environmental media were not limited to within the site boundary and appear to have migrated off-site through several pathways. Defence and State agencies require up-to-date data to assess the performance of implemented management actions and enable informed risk management decisions to protect human health and the environment, given that elevated concentrations of PFAS have been identified in environmental media.
Step 2: Identify the decision/goal of the study	The goal of the study is to establish: • A systematic routine groundwater, surface water and sediment sampling and analysis program to provide current and ongoing information on the distribution of PFAS in the Management Area. • A dataset that can be used to assess spatial and temporal changes in PFAS concentrations in groundwater, surface water and sediment in the Management Area. This will facilitate review and refinement of the CSM, if required; allow for the update of the human health and

Process	Description
	ecological risk assessment; and inform management decisions by Defence, NSW EPA, and possibly other government agencies.
Step 3: Identify the information inputs	To allow assessment of the data against the study goal listed in Step 2 above, the following inputs will be considered: • Groundwater, surface water and sediment data collected and analysed for PFAS, as part of this OMP. • PFAS results from previous environmental investigations. • Meteorological data including rainfall. • Previous and new data collected during the residential sampling program, where permission to use the data has been granted by landowners. • Groundwater and surface water elevation and flow data. • Advances in laboratory analytical approaches and changes in regulatory requirements. • Additional data from other projects or investigations (e.g. works associated with the PMAP, remediation activities or other Defence projects) that may have findings relevant for the OMP.
Step 4: Define the boundaries of the study	The spatial and temporal boundaries that apply for data collection are detailed below and will influence the decision-making process for ongoing monitoring: • The spatial boundary for data collection is limited to the Management Area, except for upstream or upgradient (background) locations. Management Areas are subject to change with input from the NSW Government. • The sampling completed as part of the OMP is limited to groundwater, surface water and sediment, at the frequencies defined in Section 4.3. • The monitoring will be long term (beyond 5 years) and ongoing.
Step 5: Develop the analytical approach/decision rules	The analytical approach is as follows: • Analytical selection – all samples will be analysed for the extended PFAS suite (refer to Appendix E) by National Association of Testing Authorities (NATA) accredited laboratories. • Analytical method selection for PFAS is based on achieving appropriate laboratory level of reporting (LOR) in the various media to be analysed. • Sample locations have been selected with the objective of monitoring PFAS trends (temporal), providing early warning of changes in the migration of PFAS in the Management Area in surface water and groundwater, and to assist with refinement of Management Area boundary over time, as required. • Field duplicate (intra and inter laboratory) samples are to be collected at a rate of at least 1 in 10 consistent with the PFAS NEMP Version 3.0 (HEPA, 2025). • Rinsate blanks required where reusable equipment and decontamination procedures are necessary at a rate of one per day per equipment. • Field blanks samples at a rate of one per day. • If the field and laboratory quality assurance (QA) / quality control (QC) data are within the acceptable DQI ranges (refer to the SAQP), the data will be considered suitable for use. The decision rules can be defined as:

Process	Description
	• If PFAS concentrations are reported above the laboratory LOR, where it was previously <LOR, consider re-analysis by the laboratory and/or re-mobilising to collect another sample from the same location, and further assessment of the data. • If PFAS is reported at a concentration above a trigger value in the OMP, consider re-analysis by the laboratory and/or re-mobilising to collect another sample from the same location, and further assessment of the data. Refer to Section 7 for OMP trigger values and action/responses if trigger values are exceeded. • A statistical trend approach, such as Mann Kendall analysis, to identify likely, increases, decreases or stabilisation of concentrations over time will use a specified statistical confidence limit.
Step 6: Specify performance or acceptance criteria	Specific limits for the works included in the OMP will be in accordance with the guidance made or endorsed by state and national regulations, standard procedures for field sampling and handling, and DQIs. This step examines the certainty of conclusive statements based on the available new data collected. This should include the following points to quantify tolerable limits: • A decision can be made based on a certainty assumption of 95% confidence in any given data set. A limit on the decision error will be 5% that a conclusive statement may be a false positive or false negative. • A decision error in the context of the decision rule presented above would lead to either underestimation or overestimation of the risk level associated with a particular sampling area. • Sampling errors may occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the site. To address this, the OMP outlines minimum numbers of samples proposed to be collected from each media. • There may be limitations in the data if aspects of the OMP cannot be implemented. Some examples of this scenario include but are not limited to: - Proposed surface water sample locations are dry at the time of sampling. - Proposed groundwater well locations are damaged or destroyed and cannot be sampled. - Proposed samples are not collected due to access being restricted. • Measurement errors can occur during sample collection, handling, preparation, analysis and data reduction. To address this the following measures are proposed: - Collection of sufficient sample mass to allow analysis to standard laboratory detections limits. Collection of insufficient sample mass may result in raised detection limits. - Field staff to follow a standard procedure when collecting samples, including decontamination of tools, and use of appropriate sample containers and preservation methods. - Laboratories to follow a standard procedure when preparing samples for analysis and undertaking analysis. - Laboratories to report QA/QC data for comparison with the DQIs established for the OMP.

Process	Description
Step 7: Develop the plan for obtaining data	The methodology presented in this OMP and the SAQP is designed to meet the program objectives and to achieve the nominated DQOs. The data collection process will be achieved by: • Working closely with the analytical laboratories and sampling equipment suppliers to ensure that appropriate procedures and processes are developed and implemented prior to and during the fieldwork, to ensure that sample handling, and transport to and processing by the analytical laboratories is appropriate. • Conducting sampling according to Defence and Australian Standards and guidance for the type of sampling being conducted, including: - PFAS NEMP (HEPA, 2025). - Standards Australia (AS/NZS5667.11–1998) Water Quality – Sampling, part 11: Guidance on sampling of groundwater. - ASC NEPM, 2013. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B2 Guideline on Site Characterisation. - Department of Defence Contamination Management Manual (August 2018, Amended June 2021). • Basing the sampling upon the developed CSM using the information available at the implementation of the OMP. Updating the CSM as new data becomes available and as required. • Continuing review of the data and modification of sampling programs to optimise the value of data generated. If the objectives of the OMP are not being met, the sampling design and approach will be reviewed and amended, as required.

4.3 Proposed monitoring intervals

The key element of the OMP is six monthly groundwater and surface water sampling at on-site and off-site locations; and annual sampling of sediment at paired surface water locations. The bi-annual sampling has occurred in the months of May and November since November 2019. It is proposed to maintain the bi-annual program in the months of May and November for groundwater and surface water to maintain the temporal data set and provide consistency in the data set for statistical analysis. Sediment sampling is proposed annually as there has been low variability in sediment PFAS concentrations to date (refer to Appendix D for further rationale).

4.4 Monitoring locations

4.4.1 Groundwater monitoring locations

Groundwater monitoring locations are presented in Table 3. The groundwater monitoring well sampling methodology will be presented in the SAQP.

Table 3. Groundwater Sample Locations

Area	Description	Sampling Locations	No. of Wells	Total Wells
On-site	Source Area Group 1 - West of site (including FFTG)	MW008, MW009, MW010, MW040, MW041, MW326	6	65

Area	Description	Sampling Locations	No. of Wells	Total Wells
	Source Area Group 1 - AFCTA and surrounds, including FTF	MW030, MW053, MW056, MW057, MW058, MW059, MW107D, MW107I, MW108	9	
	Airfield Flight Line (including Fire Station, Building 291)	MW007, MW024, MW025, MW026, MW028, MW042, MW043	7	
	Source Area Group 3 - Site Infrastructure (including Hangar 54)	MW045, MW046, MW060, MW061, MW062, MW063, MW064, MW065, MW066, MW067, MW068, MW069,	12	
	Source Area Group 4 - East of site (including Tanker Parking Area and Former Fuel Farm 1)	MW047, MW048, MW050, **MW051**, MW051D, MW052, MW072, MW073, MW074	9	
	Source Area Group 2 - STP and surrounds	MW020, MW021, MW023, MW036, MW109, MW110	6	
	Source Area Group 4 - Fuel Farm 2	MW032, MW033, MW034	3	
	Rickabys Drop Zone	MW002, MW004, MW005, MW013, MW014, MW015, MW016, MW017, MW095, MW111, MW112, MW113, MW114	13	
Off-site	West of site	MW075 (background), MW076, MW077, MW078, MW081	5	13
	North west of site	MW079, MW080, MW329, MW106	4	
	North of site	MW143, MW144	2	
	East of site	MW330, MW331	2	

Note: Location in **BOLD,** MW051, is likely targeting perched groundwater rather than the CFA and replacement well MW051D, installed adjacent to target the CFA. Both locations remain in the program for comparison.

4.4.2 Rationale for groundwater sample locations

Most groundwater locations presented in Table 3 were implemented under the 2019 OMP and have been retained to maintain consistency with the monitoring completed under the DSI (AECOM, 2018a) and the 2019 OMP. Continued monitoring of established locations will provide a consistent data set to assess temporal variability. Further rationale for the selection for groundwater locations is presented in Table 4.

Table 4. Rationale for Groundwater Sample Locations

Area	Description	Rationale
On-site	The Base, 4 Source Areas and FTF area (45 monitoring wells, see Table 3)	• Monitoring spatial and temporal variations in PFAS concentrations in groundwater up, down and cross-gradient of source areas. • Assess if groundwater PFAS concentrations within and downgradient of source areas change in response to management measures over time. • Assess if background conditions change over time.
	The Base, southern boundary, airfield flight line (7 monitoring wells)	• Monitoring spatial and temporal variations in PFAS concentrations in groundwater upgradient of source areas and in the airfield flight line. • Monitor potential changes in PFAS concentrations at the plume margins to refine CSM. • Assess if background conditions change over time.
	Rickabys Drop Zone (13 monitoring wells)	• Monitoring spatial and temporal variations in PFAS concentrations in groundwater downgradient of source areas and near the plume margins. • Assess if groundwater PFAS concentrations downgradient of source areas change in response to management measures over time.
Off-site	West of site (5 monitoring wells)	• Monitor potential changes in PFAS concentrations at the plume margins to refine model predictions and provide an indication of additional management of PFAS to groundwater users outside the current plume. • Assess if background conditions change over time.
	North west and north of site (6 monitoring wells)	• Monitor potential changes in PFAS concentrations at the plume margins to refine model predictions and provide an indication of additional management of PFAS to groundwater users outside the current plume. • Monitor groundwater wells on transects perpendicular to plume, to assist with understanding concentrations changes.
	East of site (2 monitoring wells)	• Monitor groundwater wells on transects perpendicular to plume, to assist with understanding concentrations changes.

4.4.3 Surface water monitoring locations

Surface water monitoring locations are presented in Table 5. The surface water sampling methodology will be presented in the SAQP.

Table 5. Surface Water Sample Locations

Area	Description	Sampling Locations	No. of Locations	Total
On-site	North west of site (including STP discharge point)	SW001, **SW002**, SW003, SW071	4	11

Area	Description	Sampling Locations	No. of Locations	Total
	North east of site (including tributary of Rickabys Creek)	SW005, SW007, SW014	3	
	East of site (including Rickabys Creek)	SW008, **SW009**, SW011, SW013	4	
Off-site	West of site	SW022, SW024 (background), SW035 (background)	3	12
	North of site	SW015, SW016, SW081, SW085*	4	
	East of site	SW018, SW019, SW023, SW030	4	
	South of site	SW020 (background)	1	

Note: *SW085 is located on private property; **Bold** locations are proposed for flux assessment, see Section 4.4.5.

4.4.4 Rationale for surface water sample locations

The surface water monitoring locations were selected to provide coverage of on-site drains, discharge points of the site, and off-site surface water bodies (un-named drains, Rickabys Creek, Cooley Creek, Hawkesbury River), including upstream and downstream locations. These locations were implemented under the 2019 OMP and have been retained to maintain consistency with the monitoring completed under the DSI (AECOM, 2018a) and the 2019 OMP. Continued monitoring of established locations will provide a consistent data set to assess temporal variability. Rationale for the surface water and co-located sediment locations is presented in Table 6.

Table 6. Rationale for Surface Water and Sediment Sample Locations

Area	Description	Rationale
On-site	The Base (SW/SD001) and the STP (SW/SD002, SW/SD003, SW071)	• Monitoring spatial and temporal variations in PFAS concentrations in on-base surface water and locations of off-site discharge (from the Base at SW002 and from the Base and STP at SW003). • Assess if PFAS concentrations change in response to management measures over time.
	Rickabys Drop Zone (Rickabys Creek and tributaries) (7 locations per Table 5)	• Monitoring spatial and temporal variations in PFAS concentrations in on-base surface water and location of off-site discharge (SW009). • Assess if PFAS concentrations change in response to management measures over time.
Off-site	Cross-gradient with the site to the east (SW/SD019 – Rickabys Creek) and west (SW/SD022)	• Monitor potential changes in PFAS concentrations at management area boundaries to inform CSM and management decisions.
	North of the site associated with Bakers Lagoon (SW/SD085) or downstream of Bakers Lagoon	• Monitoring spatial and temporal variations in PFAS concentrations in Bakers Lagoon.

Area	Description	Rationale
	(SW/SD081, SW/SD016 [Cooley Creek])	• Assess if PFAS concentrations change and trigger a change in potential exposure pathways or current recommended receptor precautions.
	Downstream locations east of site at Rickabys Creek (SW/SD023, SW/SD018) and Hawkesbury River (SW/SD030)	• Monitoring spatial and temporal variations in PFAS concentrations in downstream surface water. • Assess if PFAS concentrations change and trigger a change in potential exposure pathways or current recommended receptor precautions.
	Background locations: Rickabys Creek (SW/SD020) Pughs Lagoon (SW/SD035) Hawkesbury River (SW/SD024)	• Assess if surface water background conditions change over time.

Off-site monitoring locations on private property will require the agreement of the landholder/ leaseholder, refer to Section 8.

4.4.5 Surface water mass flux sampling and assessment

Surface water sampling and flow rate measurements are proposed at key locations (SW002, SW009) to estimate base load fluxes of PFAS in fresh water exiting the site and entering receiving environments.

Flow rate measurements, using level sensors, are proposed at the two locations (SW002, SW009), during at least one bi-annual surface water monitoring event. Long term flow measurement infrastructure was previously installed at the two key locations (SW002, SW009), but was damaged by flooding. Temporary installation of flow equipment is proposed as these sampling locations are in a floodplain. Level sensors will be installed at the start of the bi-annual event (May or November) and may remain for 2 subsequent months i.e. November-December or may be removed and reinstalled for the next bi-annual month, for a total of 2 months per year. This flexibility is to allow simultaneous flow rates and samples to be collected for significant rainfall events. Noting May has on average less rainfall and less days with rain >1mm compared to November. May and November can be considered “shoulder” seasons for rainfall, with winter months (July-August) typically drier and summer months (January-March) wetter (BoM Station 067105, BoM 2025).

Precipitation forecasts will be monitored for the months of May and November to identify rainfall events. If suitable events are identified (high certainty of rainfall; conditions safe to mobilise) opportunistic surface water samples for PFAS analysis will be collected at SW002 and SW009 at intervals throughout the event, aiming to collect three samples across the hydrograph (rising, peak, and recession). It is assumed baseline samples will be collected as part of the preceding OMP event.

Natural variability and unpredictability of rainfall events and their duration can limit sampling opportunities. Ideally at least one rainfall influenced surface water sampling event combined with flow measurements will occur during an annual monitoring period.

Flux estimate calculations of PFAS in fresh water entering receiving environments will be made annually in the Ongoing Monitoring Report (OMR), using data obtained in the bi-annual events.

4.4.6 Sediment monitoring locations

Sediment monitoring locations are presented in Table 7. The sediment sampling methodology will be presented in the SAQP. Sediment samples are proposed to be collected annually in the November events. Where a surface water location is found to be dry, a sediment sample will not be collected, as dry conditions are not representative of the aquatic environment.

Table 7. Sediment Sample Locations

Area	Description	Sampling Locations	No. of Locations	Total
On-site	North west of site	SD001, SD002, SD003	3	10
	North east of site (including tributary of Rickabys Creek)	SD005, SD007, SD014	3	
	East of site (including Rickabys Creek)	SD008, SD009, SD011, SD013	4	
Off-site	West of site	SD022 (background), SD024 (background), SD035 (background)	3	12
	North of site	SD015, SD016, SD081, SD085*	4	
	East of site	SD018, SD019, SD023, SD030	4	
	South of site	SD020 (background)	1	

*Note: SD085 is located on private property

4.4.7 Rationale for sediment sample locations

The sediment monitoring locations were selected to be co-located with surface water sample locations under the 2019 OMP and have been retained to maintain consistency with the monitoring completed under the DSI (AECOM, 2018a) and the 2019 OMP. Continued monitoring of established locations will provide a consistent data set to assess temporal variability. Refer to Table 6 for the rationale for co-located sediment and surface water sample locations.

Sediment sampling to be conducted on an annual basis. Refer to Appendix D for the rationale of a reduction from bi-annual to annual sediment sampling.

Off-site monitoring locations on private property will require the agreement of the landholder/ leaseholder, refer to Section 8.

4.5 Sample analysis

Samples will be analysed by a NATA accredited laboratory for a suite of PFAS as outlined in Appendix E, using NATA accredited methods. Laboratory LORs must be selected to achieve the OMP objectives and the DQOs (Section 4.2). Standard laboratory LORs have been proposed for this program, except for select background, downgradient or offsite surface water and groundwater locations with historical results below the existing PFOS LOR (0.01 micrograms per litre [µg/L]), where low level LORs are proposed to further inform understanding of background and downgradient conditions. Details will be provided in the SAQP.

QA / QC measures will be outlined in the SAQP.

In addition to PFAS laboratory analysis, field measurement of water quality parameters such as pH, electrical conductivity (EC), redox potential, dissolved oxygen (DO), temperature, total dissolved solids (TDS), and turbidity (where feasible) will be undertaken on surface water and groundwater samples. The standing water level (SWL) at each groundwater monitoring well will also be recorded prior to sampling. Methods will be detailed in the SAQP.

5 OTHER ASPECTS

To achieve the OMP objectives (Section 1.2), inform the CSM and allow assessment of the site risk profile, a review of other aspects will also be undertaken, including (but not limited to) water use surveys, registered bore searches, change in land zoning, changes in land use on/off base, development works, remediation works, etc.

This section provides details of the other aspects review requirements.

Table 8. Other Aspects for Review

Aspect	Review Requirements / Considerations
Other projects or investigations	The OMP should consider other sources of information including other projects, studies or investigations including, but not limited to: • Works associated with the PMAP or remediation activities. • Other investigation or remediation works (i.e. non PFAS) which may identify other hydrogeological or contaminant transport findings.
Development works or changes in on-base land use	The OMP will consider development works and/or changes in on-base land use that may have the potential to impact the nature, extent or transport of PFAS, or changes to potential receptors, including: • A significant change in land use may trigger an OMP review and update. • Projects planned for the next 12-month monitoring period, particularly where works relate to a source area. • Infrastructure or construction works.
Development works or changes in off-base land use	The OMP will consider development works and/or changes in off-base land use that may have the potential to impact the nature, extent or transport of PFAS, or changes to potential receptors, including: • A significant change in land use in or adjacent to the Management Area may trigger an OMP review and update (e.g. are new monitoring locations required? Have pathways and/or receptors in the CSM changed?).
Significant weather or natural disaster events	Significant weather or natural disaster events may prompt an OMP review, including prolonged wet or dry periods, flooding or fires. These events have potential to impact PFAS concentrations, monitoring locations, and accessibility.
Water use surveys	The OMP will consider data collected through the water use surveys that identify any changes in water use or land use activities which may impact the CSM and respective risk profiles.
Changes in Management Area extents	The OMP will consider any changes made to the geographical extents of the existing Management Areas.
Changes in NSW Government Precautionary Advice	The OMP will consider any changes made by the NSW Government regarding Precautionary Advice for residents in or surrounding the Management Areas.
Changes in national PFAS guidance	The OMP will require updating if any changes to national guidance for PFAS e.g. the PFAS NEMP (HEPA, 2025), occur.

6 PFAS SCREENING CRITERIA

Adopted screening criteria references national guidance that was available at the time of preparing this OMP, including:

- HEPA, 2025. PFAS NEMP Version 3.0.
- National Health and Medical Research Council (NHMRC), 2019. Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water. August 2019.
- Department of Health (DoH), 2017. Health Based Guidance Values for PFAS for use in site investigations in Australia. April 2017. This document is based on the works undertaken by FSANZ (2017).

The adopted screening criteria are presented in Table 9 and Table 10 below.

Table 9. PFAS Adopted Screening Criteria – Human Health

Media	Pathway	Compound	Criteria	Reference
Water – groundwater	Drinking water	PFOS + PFHxS	0.07 µg/L	HEPA, 2025; DoH, 2017
		PFOA	0.56 µg/L	HEPA, 2025; DoH, 2017
Water – surface water	Recreation	PFOS + PFHxS	2 µg/L	HEPA, 2025; NHMRC, 2019
		PFOA	10 µg/L	HEPA, 2025; NHMRC, 2019

Table 10. PFAS Adopted Screening Criteria – Ecological

Media	Pathway	Compound	Criteria	Reference
Water (freshwater) – groundwater and surface water	Bioaccumulation	PFOS	0.00023 µg/L	HEPA, 2025 (99% species protection)
		PFOA	19 µg/L	HEPA, 2025 (99% species protection)

Per the PFAS NEMP (HEPA, 2025) and the Water Quality Guideline (WQG) framework (Australian Government, 2023), compounds with bioaccumulation potential should consider the next most protective default guideline value (DGV) than the normally applicable value (e.g. 99% species protection DGV for a slightly to moderately disturbed ecosystem). The 99% species protection level for PFOS is close to available laboratory levels of detection and the PFAS NEMP (HEPA, 2025), notes a 'detect' threshold may be used in some circumstances. It is proposed that the standard laboratory LOR (0.01 µg/L) is adopted for the purposes of screening PFOS analytical water results, rather than the criteria value. This value is 10 x lower than the 95% species protection level for PFOS (0.13 µg/L) and it is noted that the three background surface water monitoring locations (SW020, SW024, SW035) have recorded PFOS concentrations above the standard LOR (0.01 µg/L) during the OMP program.

Screening criteria for PFAS in sediments are not available in the NEMP Version 3.0 (HEPA, 2025).

7 TRIGGERS FOR ACTION AND REVIEW

Implementing appropriate triggers is critical for Defence's approach to manage risks to receptors from PFAS contamination. Triggers are performance measures for assessing PFAS impacts and are paired with actions or responses that describe the measure to be taken if triggers are exceeded.

Trigger values have been developed with consideration of the following:

- Exposure point concentrations (EPC) adopted in the HHRA (AECOM, 2018b) for groundwater and surface water. The HHRA (AECOM, 2018b) EPCs used for trigger values in this OMP were maximum concentrations reported in the study area in the HHRA and DSI (AECOM, 2018a).
- EPCs adopted in the ERA (AECOM, 2018c) for surface water. EPCs used for trigger values were maximum concentrations reported in the ERA and DSI (AECOM, 2018a).
- Relevant guidelines or assessment criteria as listed in Section 6 PFAS Screening Criteria.

PFAS analytical results require review upon receipt. The decision for re-analysis by the laboratory is coordinated in consultation with Defence. Re-analysis is typically required for results that are first time detections in water matrices, new exceedances of trigger values or human health guidelines, or changes greater than an order of magnitude than previously recorded.

Data validation processes will be further detailed in the OMP SAQP.

Table 11. Trigger Levels and Actions

Trigger	Action
Groundwater	
First time exceedance in off-site groundwater of the adopted groundwater EPC for off-site agricultural workers per the HHRA (AECOM, 2018b): • 2.51 µg/L PFOS • 3.8 µg/L PFHxS and the drinking water guideline (HEPA, 2025): • 0.56 µg/L PFOA	1. Resample within 2 months to verify continued exceedance (note this is in addition to the data validation steps in Table 2 and process to be included in SAQP i.e. laboratory re-analysis). 2. If result > trigger value confirmed, conduct qualitative site-specific review of potential exposure pathways to confirm if pathways are present. 3. If trigger value exceeded in 2 consecutive OMP events (and in re-samples) and pathway confirmed: a. Consider an update to the site-specific quantitative risk assessment to identify if new or additional precautions to minimise receptor exposure are recommended. b. Notify NSW EPA.
First time detection of PFOS, PFHxS, or PFOA above the laboratory LOR at a sentinel well (i.e. MW082, MW091, and MW092)	1. Resample within 2 months to verify continued exceedance. 2. If result > trigger value confirmed: a. Review CSM, groundwater hydraulic conductivity (travel times) and potential sources. b. Conduct qualitative site-specific review of potential exposure pathways to confirm if pathways are present.
Surface Water	

Trigger	Action
First time exceedance in off-site surface water of the adopted surface water EPC for off-site agricultural or council workers per the HHRA (AECOM, 2018b): • 3.06 µg/L PFOS • 1.69 µg/L PFHxS and the drinking water guideline (HEPA, 2025): • 0.56 µg/L PFOA Note this water EPC was also used to calculate the EPC for home grown meat (Scenario 1 – access to Bakers Lagoon) in the HHRA (AECOM, 2018b).	1. Resample within 2 months to verify continued exceedance. 2. If result > trigger value confirmed, conduct qualitative site-specific review of potential exposure pathways to confirm if pathways are present. Pathway review to also consider residents and consumption of home grown animal products in study area[1]. 3. If trigger value exceeded in 2 consecutive OMP events (and in re-samples) and pathway confirmed: a. Consider an update to the site-specific quantitative risk assessment to identify if new or additional precautions to minimise receptor exposure are recommended. b. Consider if biota sampling should be added to the OMP. c. Notify NSW EPA.
First time exceedance of recreational water guideline (refer to Table 9) in off-site surface water bodies accessible to the public: Cooley Creek, Rickabys Creek, Hawkesbury River.	1. Resample within 2 months to verify continued exceedance. 2. Notify NSW EPA of a verified exceedance. 3. Consider increasing frequency and locations of monitoring in the OMP.
First time exceedance in the downstream Hawkesbury River location (SW030) of the adopted Hawkesbury River EPC per the ERA (AECOM, 2018c): • 0.17 µg/L PFOS	1. Resample within 2 months to verify continued exceedance. 2. If result > trigger value confirmed: a. Consider sampling at additional upstream locations to investigate source. b. Consider if biota sampling should be added to the OMP.
All Media (Groundwater, Surface Water, Sediment)	
Increasing PFAS trend identified.	1. Assess data to determine if updates to the CSM, risk profile and/or PMAP are required, consider potential ecological and human receptors. 2. Consider if current monitoring network is sufficient, if not update OMP.
New source, pathway or receptor identified (i.e. a water use survey, other project, or community feedback indicates new CSM understanding).	1. Determine if the CSM, risk profile, PMAP and/or OMP require update. 2. Review OMP to consider the CSM, monitoring locations and frequency, screening criteria and trigger values.
No triggers exceeded and PFAS trends considered stable or decreasing for 3 consecutive 6-monthly monitoring events.	Review the OMP to consider: • a decrease in frequency of monitoring, • a decrease or change in monitoring locations, or • a cease in monitoring.

Note:

1. The HHRA (AECOM, 2018b) provided precautions for the intake of home grown red meat and eggs from home grown poultry. These precautions were calculated based on maximum soil and maximum surface water concentrations for the study area. The same maximum water concentrations were used

for the adopted surface water EPC for off-site agricultural or council workers (AECOM, 2018b). If this trigger is exceeded, pathways for off-site residents should also be reviewed.

7.1 OMP Document Review

Based on the current site understanding and existing data, this OMP should be implemented for an initial three-year period, and subsequently reviewed in a minimum of three years. Other factors may trigger an OMP review, these include:

- Changes to the CSM understanding, including sources, transport (pathways and flow rates), or potential receptors (including any significant changes of land use), and/or risk profiles.
- Changes to the PMAP or following remediation actions.
- Changes in relevant State or Commonwealth advice, policy, standards or guidelines relating to PFAS or the site.
- Changes to Defence's strategic approach to managing PFAS contamination.
- Feedback and/or information received from community consultation.

8 REPORTING REQUIREMENTS

8.1 Reporting

After each monitoring event, information, field and laboratory data will be documented in a factual report. At the end of the specified monitoring period (typically 12 months) the whole data set (including the current and historic data) will be reviewed, and an OMR prepared.

The OMR will report on the objectives of the OMP, which are to identify and evaluate:

- spatial, and temporal (including seasonal) variability of PFAS in the environment;
- changes to sources, transport pathways or receptors, as described in the CSM for the Base;
- changes in risks to human and environmental receptors;
- changes that risk management activities at the Base, as outlined in the 2019 PMAP, have had on PFAS in the environment; and
- whether the identified changes trigger a prescribed action and/or review (Section 7).

8.2 Stakeholder engagement

Engagement with a range of stakeholders, such as NSW EPA, Councils, other agencies, and the community will be undertaken.

Where off-site monitoring is undertaken a separate letter will be provided to the stakeholder presenting the results of the monitoring event.

The OMP will be published on the Defence website, along with the current PMAP and OMRs.

APPENDIX A REFERENCES

PFAS Site Plans

Defence 2019a, PFAS Management Area Plan – RAAF Base Richmond, August 2019.

Defence 2019b, PFAS Ongoing Monitoring Plan – RAAF Base Richmond, August 2019.

Nation Partners, 2024, RAAF Base Richmond – PFAS Ongoing Monitoring Sampling and Analysis Quality Plan, Date TBC.

Site Reports

AECOM Australia Pty Ltd, 2018a. Detailed Site Investigation RAAF Base Richmond – PFAS Investigation. 13 June 2018.

AECOM Australia Pty Ltd, 2018b. Human Health Risk Assessment, November 2018 – RAAF Base Richmond PFAS Investigation. 07 November 2018.

AECOM Australia Pty Ltd, 2018c. Ecological Risk Assessment, November 2018 – RAAF Base Richmond PFAS Investigation. 07 November 2018.

AECOM Australia Pty Ltd, 2021. RAAF Richmond – PFAS Mass Flux Report. Rev 0. 18 November 2021.

AECOM Australia Pty Ltd, 2023. PFAS Ongoing Monitoring Plan – RAAF Base Richmond, Ongoing Monitoring Interpretive Report 2021 - 2023. Revision F. 11 August 2023.

Guidance and Standards

ASC NEPM, 2013. Schedule B2. National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) Schedule B2 Guideline on Site Characterisation.

Australian Government, 2023. Australian & New Zealand Guidelines for Fresh & Marine Water Quality Website, 'Accounting for local conditions'. Last updated March 2023. Accessed at: https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/local-conditions.

FSANZ, 2017. Supporting Document 1: Hazard assessment report – Perfluorooctane Sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), Perfluorohexane Sulfonate (PFHxS).

Heads of EPAs Australia and New Zealand (HEPA) 2025. PFAS National Environmental Management Plan (NEMP), Version 3.0. March 2025.

National Health and Medical Research Council (NHMRC), 2011. Australian Drinking Water Guidelines 6, 2011. Version 3.7 Updated January 2022. January 2022.

Standards Australia, 1998. AS/NZ 5667:1998 Water quality – sampling.

Data

Bureau of Meteorology (BoM), Climate Statistics for Station: RICHMOND RAAF Site number: 067105, accessed at: http://www.bom.gov.au/climate/data, March 2025.

APPENDIX B FIGURES

List of Figures

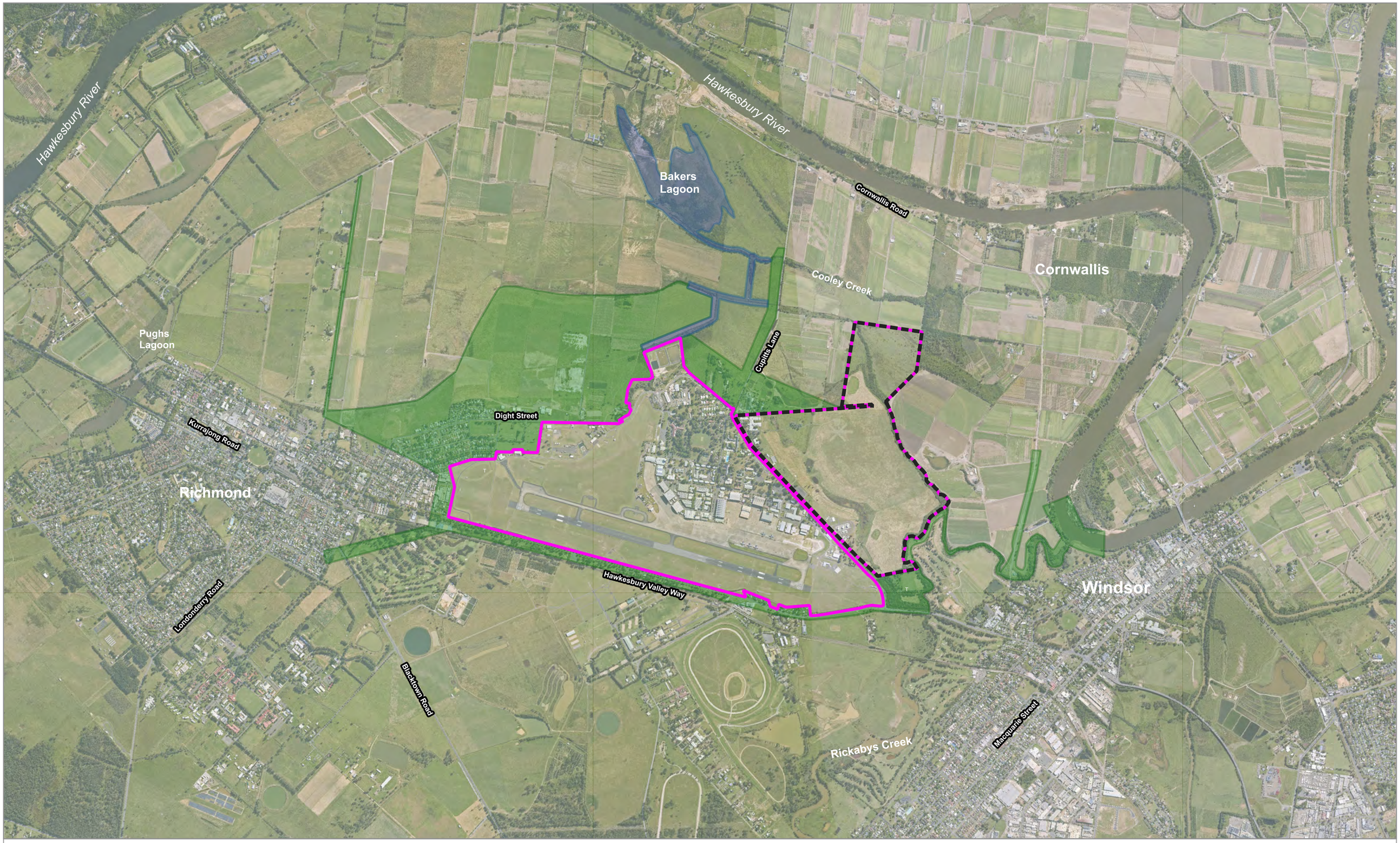

Figure 1: Site Layout and Management Areas

RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

- On-site Management Area
- Off-site Management Area
- Bakers Lagoon Management Area
- Rickabys Drop Zone

DATA SOURCES
Imagery: MetroMaps, 2024

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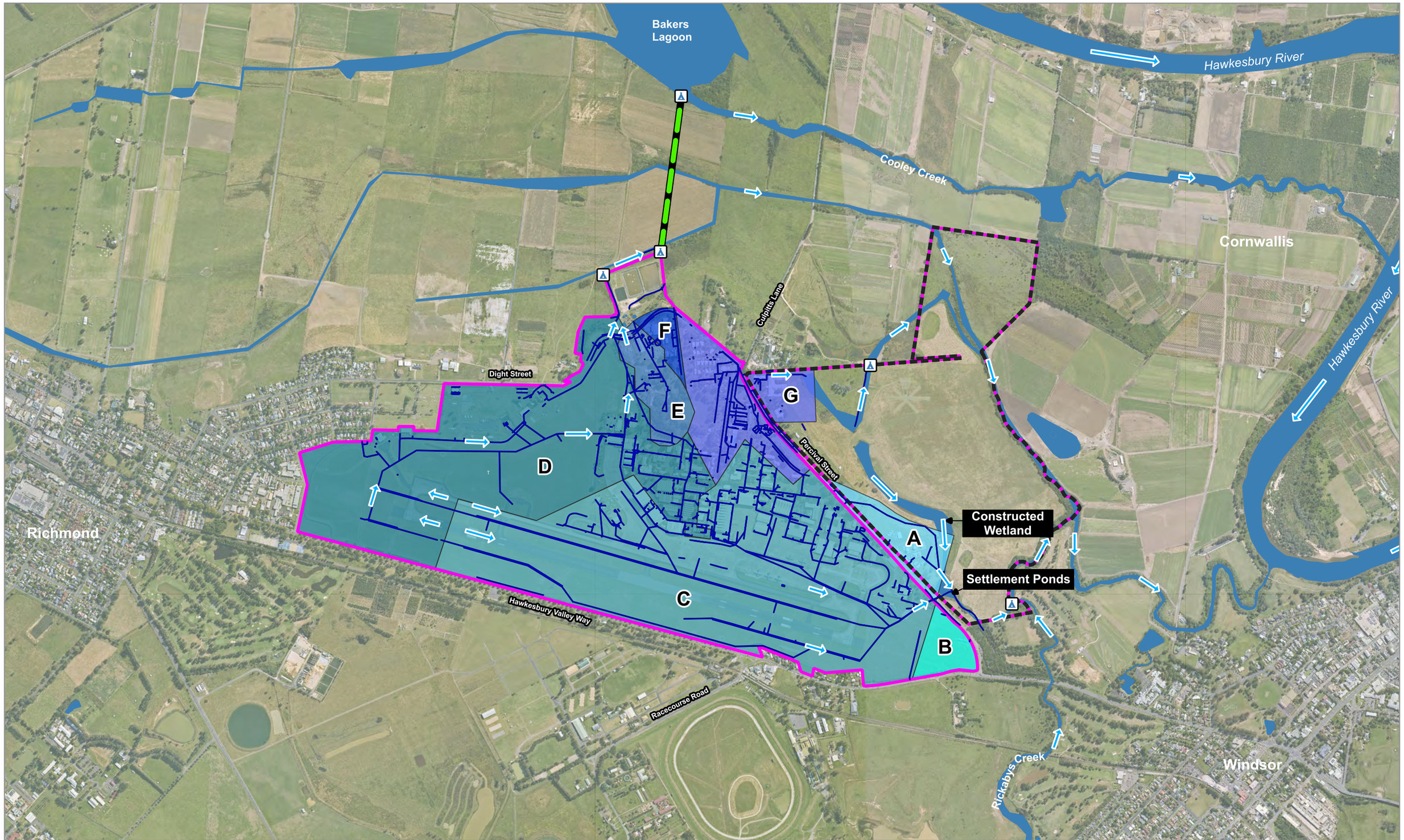


Figure 2: On-site Surface Water Network and Catchment Areas

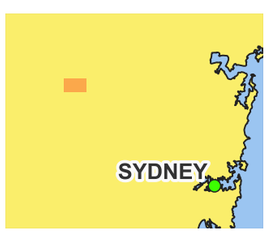
RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

- Base Boundary
- Rickabys Drop Zone
- Off-site Discharge Point
- Drainage Flow Direction
- Discharge Pipe from STP
- On-site Stormwater Drainage

Catchment Areas

- Catchment Area A
- Catchment Area B
- Catchment Area C
- Catchment Area D
- Catchment Area E
- Catchment Area F
- Catchment Area G



DATA SOURCES
Imagery: MetroMaps, 2024

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Bakers Lagoon

Hawkesbury River

Cooley Creek

Sewage Treatment and Trade Waste Plant (CSR_NSW_000939 & (CSR_NSW_000731)

Foam Testing Facility (Not currently a CSR or confirmed source. Currently under further assessment)

Culpitts Lane

Cornwallis

Airfield Foam Cannon Testing (CSR_NSW_000705)

Dight Street

Former Fire Training Ground (CSR_NSW_000700)

Hawkesbury River

Percival Street

Hangar 54 (CSR_NSW_000766)

Fire Vehicles (CSR_NSW_001132)

Richmond

Fuel Farm 2 (CSR_NSW_000945)

Fire Station Building 291 (CSR_NSW_000728)

Tanker Parking Area and Former Fuel Farm 1 (CSR_NSW_000942)

USAF C141 Incident 1977, Fuel Leaks (CSR_NSW_001133)

USAF C141 Incident 1997 (CSR_NSW_001133)

Hawkesbury Valley Way

Area used by Fitters (CSR_NSW_000942)

Racecourse Road

Windsor

Rickabys Creek

Figure 3: PFAS Source Zones

RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

- Base Boundary
- Rickabys Drop Zone
- Group 1 PMAP Source
- Group 2 PMAP Source
- Group 3 PMAP Source
- Group 4 PMAP Source

SYDNEY

DATA SOURCES
Imagery: MetroMaps, 2024

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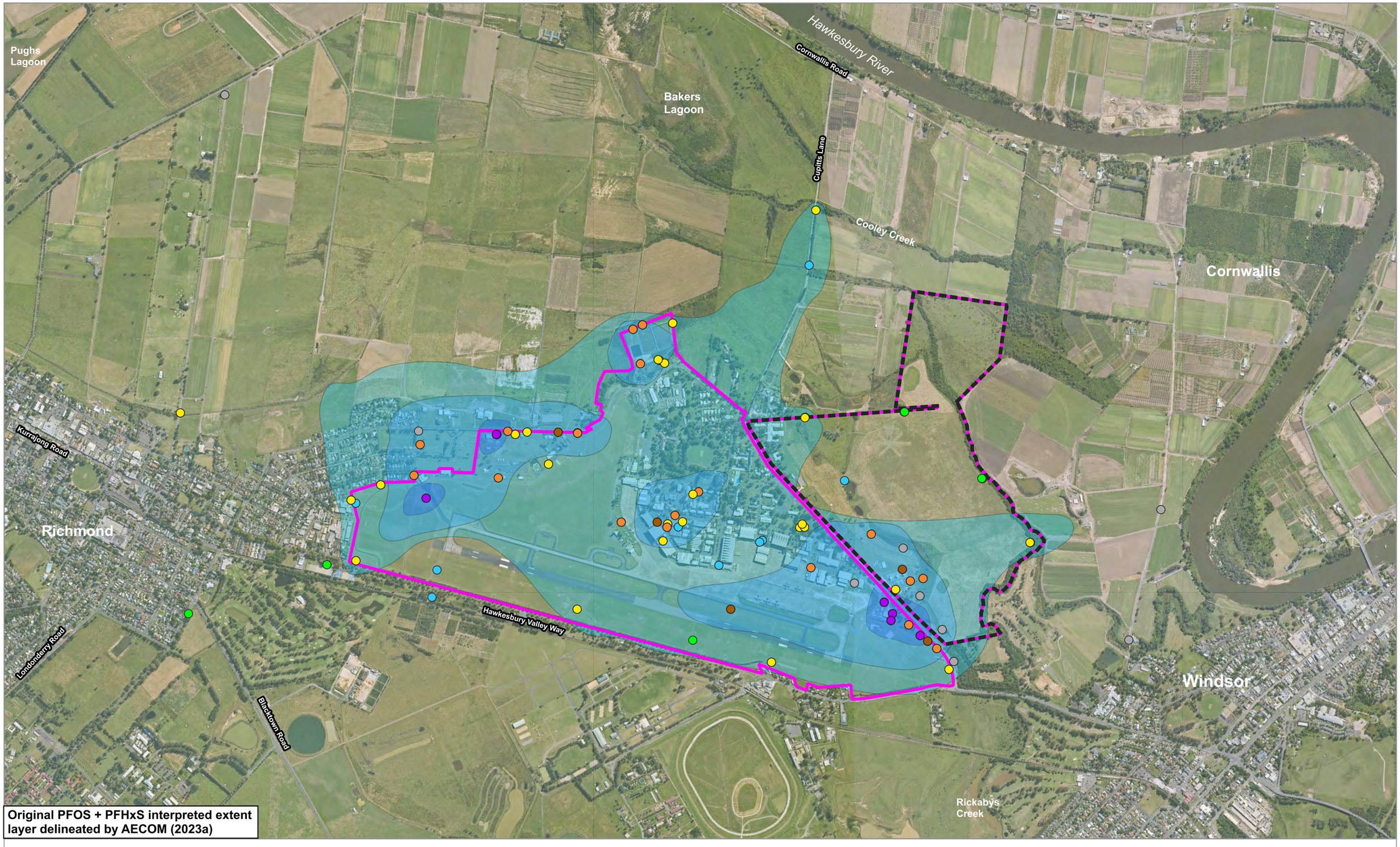


Figure 4: Interpreted Extent of PFOS + PFHxS Impact in Groundwater, May 2024

RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

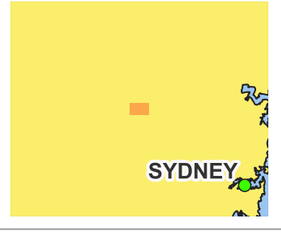
- Defence Site Boundary
- Rickabys Drop Zone

Groundwater - PFOS + PFHxS (µg/L)

- > 50
- > 10 - 50
- > 1 - 1 0
- > 0.07 - 1
- Limit of Reporting - 0.07
- < Limit of Reporting
- Not Sampled

Interpreted PFOS + PFHxS Concentration Range (µg/L)

- > 50
- > 10 - 50
- > 0.07 - 10



DATA SOURCES
Imagery: MetroMaps, 2024

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nation partners

Figure 5: Groundwater Sampling Locations

RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

- Defence Site Boundary
- On-site Management Area
- Off-site Management Area
- Bakers Lagoon Management Area
- Rickabys Drop Zone
- OMP Groundwater Sampling Locations

DATA SOURCES
Imagery: MetroMaps, 2024

N

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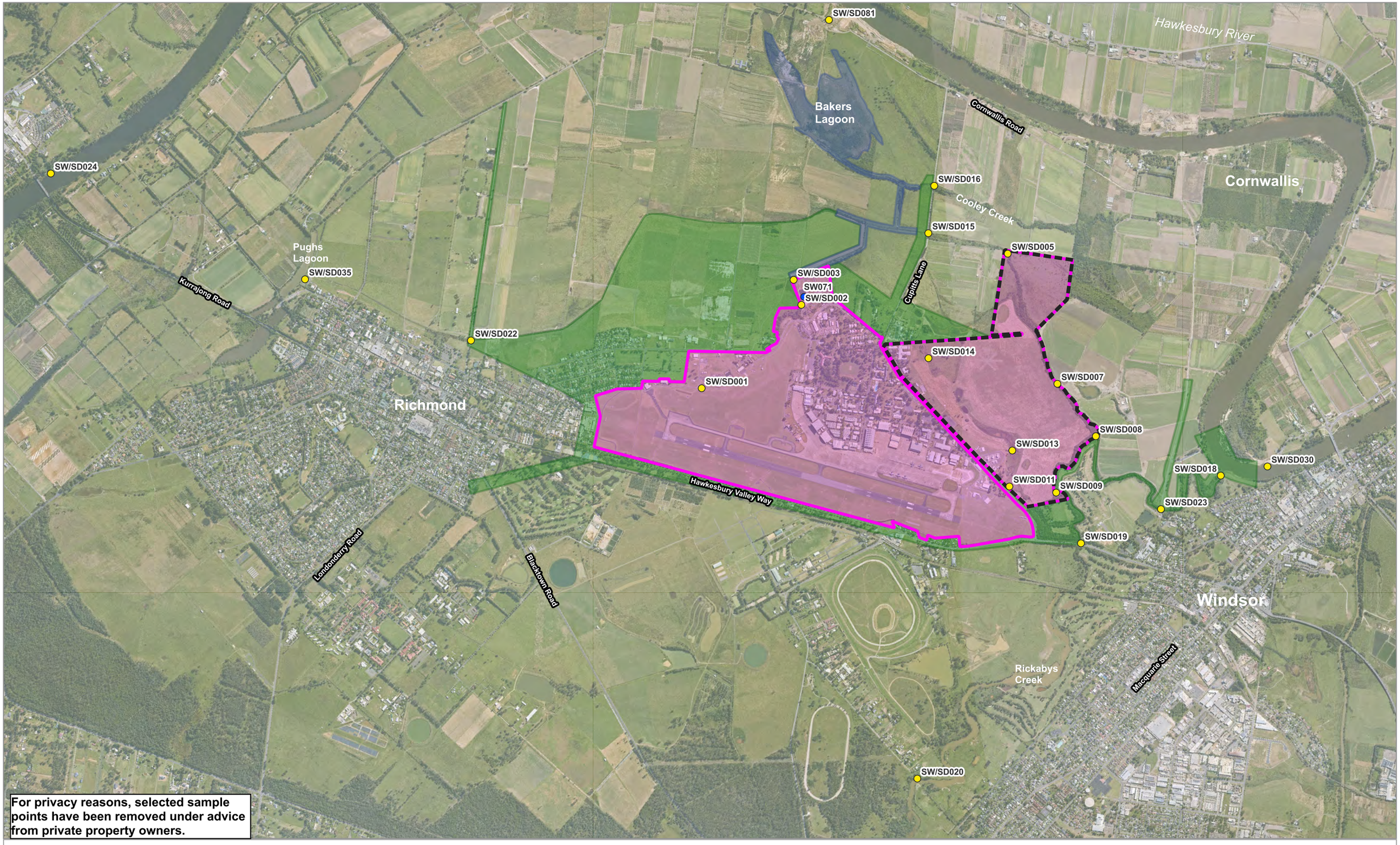
SYDNEY

nation partners



For privacy reasons, selected sample points have been removed under advice from private property owners.

Figure 6: Surface Water and Sediment Sampling Locations

RAAF Base Richmond
PFAS Ongoing Monitoring Plan

Legend

- Defence Site Boundary
- On-site Management Area
- Off-site Management Area
- Bakers Lagoon Management Area
- Rickabys Drop Zone
- Co-located Surface Water and Sediment Sampling Locations
- Surface Water Sampling Locations

DATA SOURCES
Imagery: MetroMaps, 2024

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200 0 200 400 600 m

nation partners

APPENDIX C SAMPLE LOCATION INFORMATION

PFAS Ongoing Montioring Plan
RAAF Base Richmond

Sample Location Information

Location ID	Historical Name	On-site/ Off-site	Latitude	Longitude	Top of Casing Elevation (mAHD)	Screen Interval (mbgl)	Depth (mbgl) (May2024)	Sampling Frequency
MW002	BBNA-NAA-MW02A, MW02	on-site	-33.59901617	150.8012765	9.86	5.9 - 8.9	9.78	Bi-annual
MW004	BBNA-NAA-MW03, MW04	on-site	-33.59582931	150.7970044	7.18	9-12	13.3	Bi-annual
MW005	BBNA-BH24/5,MW05	on-site	-33.59598332	150.7914838	9.113	unknown	10.03	Bi-annual
MW007	BBRS-NAA-MW01, MW07	on-site	-33.60736	150.7893185	16.03	8.8 - 11.8	12.05	Bi-annual
MW008	BBRW-NAA-MW01, MW08	on-site	-33.59870431	150.7677632	20.93	12-15	16.8	Bi-annual
MW009	BBRW-BHB5, MW09	on-site	-33.59953543	150.7663517	20.44	unknown	13.17	Bi-annual
MW010	BBA-NAA-MW01, MW10	on-site	-33.60221237	150.7662935	21.06	17.9 - 20.9	21.04	Bi-annual
MW013	SW0257-NAA-MW02, MW13	on-site	-33.60441623	150.7976695	7.93	4-7	n/a	Bi-annual
MW014	SW0257-NAA-MW03, MW14	on-site	-33.60217337	150.7967891	6.24	5.3 - 8.3	n/a	Bi-annual
MW015	SW0257-NAA-MW04, MW15	on-site	-33.60149277	150.7950285	7.02	5.5 - 8.5	8.98	Bi-annual
MW016	SW0257-NAA-MW05, MW16	on-site	-33.59896972	150.7936057	7.39	2-5	5.98	Bi-annual
MW017	SW0257-BHFF8,MW17	on-site	-33.60360814	150.7978625	6.51	unknown	4.8	Bi-annual
MW020	SW0057-STP2,MW20	on-site	-33.59317928	150.7834314	8.945	unknown	6.53	Bi-annual
MW021	SW0057-STP3,MW21	on-site	-33.59332259	150.7823718	7.88	unknown	3.93	Bi-annual
MW023	SW0057-STP7,MW23	on-site	-33.59146214	150.7842187	6.01	unknown	4.45	Bi-annual
MW024	SW0256-NAA- MW01, MW24	on-site	-33.60068489	150.7811166	19.92	12-15	15.32	Bi-annual
MW025	SW0256-NAA-MW02, MW25	on-site	-33.6027922	150.7865042	17.14	16.1 - 20.1	20.38	Bi-annual
MW026	SW0256-NAA-MW03, MW26	on-site	-33.60299202	150.7916283	16.9	9.2 - 12.2	12.04	Bi-annual
MW028	SW0256-NAA-MW05, MW28	on-site	-33.60484986	150.7871089	16.9	8.2 - 11.2	11.25	Bi-annual
MW030	SW0054-BH8/8, MW30	on-site	-33.59647732	150.7787893	21.262	12.5 - 17.5	17.25	Bi-annual
MW032	SW0249-NAA-MW02, MW32	on-site	-33.60316401	150.7967208	17.81	12-15	14.3	Bi-annual
MW033	SW0249-NAA-MW03, MW33	on-site	-33.60371265	150.7971486	14.84	10-13	12.5	Bi-annual
MW034	SW0249-NAA-MW04, MW34	on-site	-33.60409463	150.79632	16.93	14 - 17	16.2	Bi-annual
MW036	SW0263-NAA-MW20	on-site	-33.59331968	150.7837187	20.82	17.8 - 21.8	21.96	Bi-annual
MW040	SW0236-NAA-MW01, MW40	on-site	-33.59937185	150.7702781	19.52	15 - 18	18.09	Bi-annual
MW041	SW0234-NAA-MW01, MW41	on-site	-33.60272642	150.7707952	19.73	13.6 - 16.6	16.66	Bi-annual
MW042	SW0237-NAA-MW01, MW42	on-site	-33.60469652	150.7785569	18.32	13.3 - 16.3	16.42	Bi-annual
MW043	SW0235-NAA-MW01, MW43	on-site	-33.6062541	150.7849609	16.45	14.9 - 17.9	17.05	Bi-annual
MW045	SW0241-NAA-MW02, MW45	on-site	-33.60167291	150.7889573	16.74	14.9 - 17.9	18.1	Bi-annual
MW046	SW0241-NAA-MW03, MW46	on-site	-33.60175133	150.7888044	16.71	14.9 - 17.9	17.93	Bi-annual
MW047	SW0061-NAA-MW01, MW47	on-site	-33.6068844	150.7985443	13.78	9-12	11.68	Bi-annual
MW048	SW0061-NAA- MW02, MW48	on-site	-33.60786987	150.7991981	17.62	10.3 - 13.3	13.95	Bi-annual
MW050	SW0061-BH102/2, MW50	on-site	-33.60575702	150.7970104	10.2	unknown	7.9	Bi-annual
MW051	SW0061-BH102/5, MW51	on-site	-33.60626405	150.7976333	10.3	1.5 - 4.5	5.48	Bi-annual
MW051D	-	on-site	-33.60627489	150.7976245	10.67	9 - 12	12	Bi-annual
MW052	SW0061-BH102/6, MW52	on-site	-33.6065329	150.7980467	10.71	6 - 9	8.95	Bi-annual
MW053	SW0138-NAA- MW01, MW53	on-site	-33.59643093	150.777713	20.95	13.5 - 16.5	16.52	Bi-annual
MW056	SW0138-BH8/17, MW56	on-site	-33.59790835	150.7771363	19.39	11.5 - 16.1	15.58	Bi-annual
MW057	SW0138-BH8/18, MW57	on-site	-33.59639075	150.7759793	22.92	14.2 - 19.2	21.15	Bi-annual
MW058	SW0138-BH8/19, MW58	on-site	-33.59633532	150.7749032	23.24	14.7 - 19.2	20.19	Bi-annual
MW059	SW0138-BH8/26, MW59	on-site	-33.59849788	150.7743197	20.74	14.7 - 19.2	17.1	Bi-annual
MW060	SW0279-NAA-MW01, MW60	on-site	-33.59934711	150.7854609	17.89	12.8 - 15.8	15.98	Bi-annual
MW061	SW0279-NAA-MW02, MW61	on-site	-33.59945868	150.7851456	18.39	10.5 - 13.5	13.31	Bi-annual
MW062	SW0238-NAA-MW01, MW62	on-site	-33.60160084	150.7834206	18.91	11.5 - 14.5	13.88	Bi-annual
MW063	SW0238-NAA-MW02, MW63	on-site	-33.60072082	150.7831198	19.62	12 - 14.5	15.25	Bi-annual
MW064	SW0059-NAA-MW01, MW64	on-site	-33.60110621	150.7910514	17.86	10.2 - 14.2	14.55	Bi-annual
MW065	SW0059-NAA-MW02, MW65	on-site	-33.601102	150.7913209	17.95	10 - 13	13.05	Bi-annual
MW066	SW0059-NAA-MW03, MW66	on-site	-33.60095549	150.7911953	18.03	11 - 15	15.18	Bi-annual
MW067	SW0246-NAA-MW01, MW67	on-site	-33.60096717	150.784288	18.6	11.7 - 14.7	14.7	Bi-annual
MW068	SW0246-NAA-MW02, MW68	on-site	-33.60042313	150.7841188	19.05	11.9 - 14.9	15.21	Bi-annual
MW069	SW0246-NAA-MW03, MW69	on-site	-33.60072808	150.7845312	19.03	13 - 16	15.95	Bi-annual
MW072	SW0003-BHFF19, MW72	on-site	-33.60467815	150.7956693	15.86	unknown	13.12	Bi-annual
MW073	SW0003-MW02,MW73	on-site	-33.60521816	150.7961189	15.331	10 - 13	11.9	Bi-annual
MW074	SW0003-MW03,MW74	on-site	-33.60553207	150.7960247	15.63	10 - 14	13.12	Bi-annual
MW075	MW75	off-site	-33.60451299	150.7569023	18.097	12 - 15	14.34	Bi-annual
MW076	MW76	off-site	-33.60399215	150.7704824	19.54	15 - 18	17.9	Bi-annual
MW077	MW77	off-site	-33.60237245	150.764673	19.942	19.5 - 22	21.79	Bi-annual

Location ID	Historical Name	On-site/ Off-site	Latitude	Longitude	Top of Casing Elevation (mAHD)	Screen Interval (mbgl)	Depth (mbgl) (May2024)	Sampling Frequency
MW078	MW78	off-site	-33.59938656	150.766097	19.807	15 - 18	17.87	Bi-annual
MW079	MW79	off-site	-33.59829612	150.769627	20.453	15 - 18	17.88	Bi-annual
MW080	MW80	off-site	-33.59623688	150.7699386	22.779	21 - 24	n/a	Bi-annual
MW081	MW81	off-site	-33.59514973	150.7566923	7.376	2.6 - 5.6	5.49	Bi-annual
MW095	MW95	on-site	-33.6061436	150.8009985	7.519	5.5 - 8.5	n/a	Bi-annual
MW106	-	off-site	-33.59686932	150.7700085	22.738	28 - 31	29.46	Bi-annual
MW107D	MW107_D	on-site	-33.59647138	150.7742963	22.973	27.5 - 30.5	31.58	Bi-annual
MW107I	MW107_I	on-site	-33.59647264	150.7742661	22.86	21.3 - 24.8	25.49	Bi-annual
MW108	-	on-site	-33.59649534	150.7787888	21.316	24.5 - 27.5	28.91	Bi-annual
MW109	-	on-site	-33.59171098	150.7820037	6.205	10.4 - 13.4	13.45	Bi-annual
MW110	-	on-site	-33.59315108	150.7833675	7.644	11.5 - 14.5	14.48	Bi-annual
MW111	-	on-site	-33.59600115	150.7914725	9.422	16 - 19	17.53	Bi-annual
MW112	-	on-site	-33.59582969	150.7970259	6.791	12.2 - 15.2	15.63	Bi-annual
MW113	-	on-site	-33.59900677	150.8012551	9.443	16 - 19	19.67	Bi-annual
MW114	-	on-site	-33.60203768	150.8038613	9.698	16.1 - 19.1	19.42	Bi-annual
MW143	-	off-site	-33.58634372	150.7923254	6.631	2 - 3	4.98	Bi-annual
MW144	-	off-site	-33.5889013	150.7918886	5.3	3 - 6	6.04	Bi-annual
MW326	-	on-site	-33.59817173	150.7704692	21.72	17.8 - 20.8	21.0	Bi-annual
MW329	-	off-site	-33.58011852	150.759514	9.00	3 - 6	6.0	Bi-annual
MW330	-	off-site	-33.60018398	150.8111797	8.56	3.5 - 6.5	6.5	Bi-annual
MW331	-	off-site	-33.6063218	150.8092954	9.01	19.5 - 22.5	22.5	Bi-annual
SW001	-	on-site	-33.59866438	150.7742543	n/a	n/a	n/a	Bi-annual
SW002	-	on-site	-33.59346091	150.7820225	n/a	n/a	n/a	Bi-annual
SW003	-	on-site	-33.59184799	150.781472	n/a	n/a	n/a	Bi-annual
SW005	-	on-site	-33.5904645	150.7979069	n/a	n/a	n/a	Bi-annual
SW007	-	on-site	-33.59886715	150.8014954	n/a	n/a	n/a	Bi-annual
SW008	-	on-site	-33.60227569	150.8043532	n/a	n/a	n/a	Bi-annual
SW009	-	on-site	-33.60583198	150.8012245	n/a	n/a	n/a	Bi-annual
SW011	-	on-site	-33.60537884	150.7976553	n/a	n/a	n/a	Bi-annual
SW013	-	on-site	-33.60307733	150.7979337	n/a	n/a	n/a	Bi-annual
SW014	-	on-site	-33.59705236	150.7916687	n/a	n/a	n/a	Bi-annual
SW015	-	off-site	-33.58904577	150.7918608	n/a	n/a	n/a	Bi-annual
SW016	-	off-site	-33.58601713	150.7923922	n/a	n/a	n/a	Bi-annual
SW018	-	off-site	-33.60496779	150.8138556	n/a	n/a	n/a	Bi-annual
SW019	-	off-site	-33.60911476	150.803042	n/a	n/a	n/a	Bi-annual
SW020	-	off-site	-33.62395964	150.7901257	n/a	n/a	n/a	Bi-annual
SW022	-	off-site	-33.59528743	150.7566714	n/a	n/a	n/a	Bi-annual
SW023	-	off-site	-33.60703545	150.8092216	n/a	n/a	n/a	Bi-annual
SW024	-	off-site	-33.58400486	150.7247868	n/a	n/a	n/a	Bi-annual
SW030	-	off-site	-33.60444785	150.8174456	n/a	n/a	n/a	Bi-annual
SW035	-	off-site	-33.59113624	150.7440703	n/a	n/a	n/a	Bi-annual
SW071	-	on-site	-33.59294	150.782249	n/a	n/a	n/a	Bi-annual
SW081	-	off-site	-33.575264	150.784754	n/a	n/a	n/a	Bi-annual
SW085	-	off-site	-	-	n/a	n/a	n/a	Bi-annual
SD001	-	on-site	-33.59866438	150.7742543	n/a	n/a	n/a	Annual
SD002	-	on-site	-33.59346091	150.7820225	n/a	n/a	n/a	Annual
SD003	-	on-site	-33.59184799	150.781472	n/a	n/a	n/a	Annual
SD005	-	on-site	-33.5904645	150.7979069	n/a	n/a	n/a	Annual
SD007	-	on-site	-33.59886715	150.8014954	n/a	n/a	n/a	Annual
SD008	-	on-site	-33.60227569	150.8043532	n/a	n/a	n/a	Annual
SD009	-	on-site	-33.60583198	150.8012245	n/a	n/a	n/a	Annual
SD011	-	on-site	-33.60537884	150.7976553	n/a	n/a	n/a	Annual
SD013	-	on-site	-33.60307733	150.7979337	n/a	n/a	n/a	Annual
SD014	-	on-site	-33.59705236	150.7916687	n/a	n/a	n/a	Annual
SD015	-	off-site	-33.58904577	150.7918608	n/a	n/a	n/a	Annual
SD016	-	off-site	-33.58601713	150.7923922	n/a	n/a	n/a	Annual
SD018	-	off-site	-33.60496779	150.8138556	n/a	n/a	n/a	Annual
SD019	-	off-site	-33.60911476	150.803042	n/a	n/a	n/a	Annual
SD020	-	off-site	-33.62395964	150.7901257	n/a	n/a	n/a	Annual
SD022	-	off-site	-33.59528743	150.7566714	n/a	n/a	n/a	Annual
SD023	-	off-site	-33.60703545	150.8092216	n/a	n/a	n/a	Annual
SD024	-	off-site	-33.58400486	150.7247868	n/a	n/a	n/a	Annual
SD030	-	off-site	-33.60444785	150.8174456	n/a	n/a	n/a	Annual
SD035	-	off-site	-33.59113624	150.7440703	n/a	n/a	n/a	Annual
SD081	-	off-site	-33.575264	150.784754	n/a	n/a	n/a	Annual
SD085	-	off-site	-	-	n/a	n/a	n/a	Annual

Note: For privacy reasons SW/SD085 co-ordinates are not provided as located on private property.
MW072 was re-surveyed by in 2023, refer to AECOM May 2023 Factual Report.
MW058 was re-surveyed by in 2024, refer to Nation Partners Nov 2024 Factual Report.
n/a - not applicable

APPENDIX D OMP REVIEW

Table 12 OMP monitoring location and frequency review

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
BW001, BW002 (off-site, private property)	No	Yes	Yes	Yes	Remove location from OMP	BW001 and BW002 (also known as POT001 and POT002) were private property residential wells that were decommissioned by the owner in 2021 and replaced by MW120 and MW121 (AECOM, 2023). Access is no longer permitted, requiring BW001, BW002, MW120, and MW121 to be removed from the program.
MW006 (Rickabys Drop Zone)	No	No	No	No	Remove location from OMP	MW006 has been destroyed. A replacement well at this location was not considered necessary as a well (MW004) had been installed to the east of this location to assess extent and risk profile.
MW019 (Rickabys Drop Zone)	No	No	No	No	Remove location from OMP	MW019 has been destroyed. A replacement well at this location was not considered necessary as MW014 and MW015 are downgradient of this location and provide a well to assess extent and risk profile.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW027, MW029 (airfield flight line)	No	No	No	No	Remove location from OMP	MW027 and MW029 have been destroyed. Replacement wells at this location were not considered necessary as MW032, MW033, and MW034 are downgradient of this location to assess extent and risk profile. Additionally, MW072 is close to MW029.
MW044 (site infrastructure)	No	No	No	No	Remove location from OMP	MW044 was destroyed in 2022. A replacement well at this location was not considered necessary as MW045 and MW046 provide coverage in this area and MW064, MW065, MW066 are downgradient of this location to assess extent and risk profile.
MW070, MW071 (site infrastructure)	Yes	No	No	No	Remove locations from OMP	MW070 and MW071 are screened in perched groundwater near Hangar 54. Perched groundwater is not representative of tertiary unconsolidated aquifers in the region. MW062 and MW067 provide coverage in this area and MW063, MW068, MW069 are immediately downgradient to assess extent and risk profile.
MW086 (off-site, east)	Yes	Yes	No	No	Remove location from OMP	MW086 was covered by stockpiled material and is considered lost. MW086 is not currently proposed to be replaced, as MW048 is upgradient at the site boundary and provides coverage of the eastern boundary.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
						PFAS trends at MW048 will continue to be assessed and changes to risk profile will trigger re-evaluation of a replacement well at MW086. If replaced, MW086 should have a monument with bollards as the area has historically been used for stockpiling/ staging of materials.
MW097, MW098 (off-site, north)	Yes	Yes	Yes	Yes	Remove locations from OMP	MW097 and MW098 were destroyed in flooding in 2021. Replaced by MW143 and MW144.
MW099 (off-site, north)	No	No	No	No	Remove location from OMP	MW099 was destroyed in flooding in 2021. A replacement well at this location was not considered necessary as MW143 and MW144 are downgradient of this location to assess extent and risk profile.
MW107I, MW107D, MW108, MW109, MW110, MW111, MW112, MW113, MW114 (site boundary)	Yes	Yes	Yes	Yes	Add locations to OMP	In 2021 these wells were added to the OMP scope to provide additional groundwater mass flux data.
MW143, MW144	Yes	Yes	Yes	Yes	Add locations to OMP	Replacement wells for MW097 and MW098 which were destroyed in 2021.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW001, MW012 (Rickabys Drop Zone)	No	No	No	No	Remove two locations from OMP	MW001 and MW012 were noted as damaged in 2024. Replacement wells at these locations were not considered necessary as MW114 is immediately adjacent to MW001 and MW095 is downgradient of MW012 and provide locations to assess nature, extent and risk profile.
MW022 (STP)	No	No	No	No	Remove location from OMP	MW022 was noted as damaged in 2024. MW023 and MW109 are located west and east of MW022 and provide extent coverage at site boundary in this area. MW022 is downgradient of STP pond Asset 248 which is not in use for effluent storage. If changes in STP operations occur a replacement well should be re-evaluated.
MW051D (area formerly used by fitters)	No	Yes	Yes	Yes	Add location to OMP	This location was installed in 2024 to target the CFA at MW051. MW051 is believed to be installed in perched groundwater and not representative of the CFA at this location.
MW054 (downgradient of AFCTA)	No	No	No	No	Remove location from OMP	MW054 noted as damaged in 2024. MW057 and MW058 are located west and east of MW054 and provide extent coverage at the site boundary in this area.

Location	Does the location inform the nature of PFAS at the site	Does the location inform the extent of PFAS at the site	Does the location inform the risk profile at the site	Does the sampling frequency inform the risk profile	OMP Review Outcome	Reason
MW326 (downgradient of FFTG)	No	Yes	Yes	Yes	Add location to OMP	This location was installed in 2024 and is downgradient of the FFTG Source Area, informing PFAS extent and risk profile for FFTG impacts.
SW037 (STP)	No	No	No	No	Change OMP Location	SW037 (also known as pond Asset 249) is no longer in use by the STP. The location was changed to SW071.
SW071 (STP)	Yes	No	Yes	Yes	Add location to OMP	SW071 is STP pond Asset 247, currently used for effluent storage before discharge.
All 22 sediment locations (see Table 7)	Yes	Yes	Yes	No	Reduce sampling frequency from bi-annual to annual	Annual sampling is considered sufficient to monitor nature and extent, inform risk profile and assess trends. Sediment is not currently considered a pathway with an elevated risk per the DSI CSM (AECOM, 2018a) and the HHRA (AECOM, 2018b). There does not appear to be seasonality impacts on sediment PFAS concentrations and there has been low apparent variability in concentrations over time. Additionally, no current screening criteria are available. i.e. ecological or human health guidelines for sediment (HEPA, 2025).

APPENDIX E PFAS ANALYTICAL SUITE

Target analytes	
Perfluoroalkane sulfonic acids	
PFBS	Perfluorobutane sulfonic acid
PFPeS	Perfluoropentane sulfonic acid
PFHxS	Perfluorohexane sulfonic acid
PFHpS	Perfluoroheptane sulfonic acid
PFOS	Perfluorooctane sulfonic acid
PFDS	Perfluorodecane sulfonic acid
Perfluoroalkyl carboxylic acids	
PFBA	Perfluorobutanoic acid
PFPeA	Perfluoropentanoic acid
PFHxA	Perfluorohexanoic acid
PFHpA	Perfluoroheptanoic acid
PFOA	Perfluorooctanoic acid
PFNA	Perfluorononanoic acid
PFDA	Perfluorodecanoic acid
PFUnDA	Perfluoroundecanoic acid
PFDoDA	Perfluorododecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFTeDA	Perfluorotetradecanoic acid
Perfluoroalkyl sulfonamides	
FOSA	Perfluorooctane sulfonamide
MeFOSA	N-Methyl perfluorooctane sulfonamide
EtFOSA	N-Ethyl perfluorooctane sulfonamide
MeFOSE	N-Methyl perfluorooctane sulfonamidoethanol
EtFOSE	N-Ethyl perfluorooctane sulfonamidoethanol
MeFOSAA	N-Methyl perfluorooctane sulfonamidoacetic acid
EtFOSAA	N-Ethyl perfluorooctane sulfonamidoacetic acid
(n:2) Fluorotelomer sulfonic acids	
4:2 FTS	4:2 Fluorotelomer sulfonic acid
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
10:2 FTS	10:2 Fluorotelomer sulfonic acid